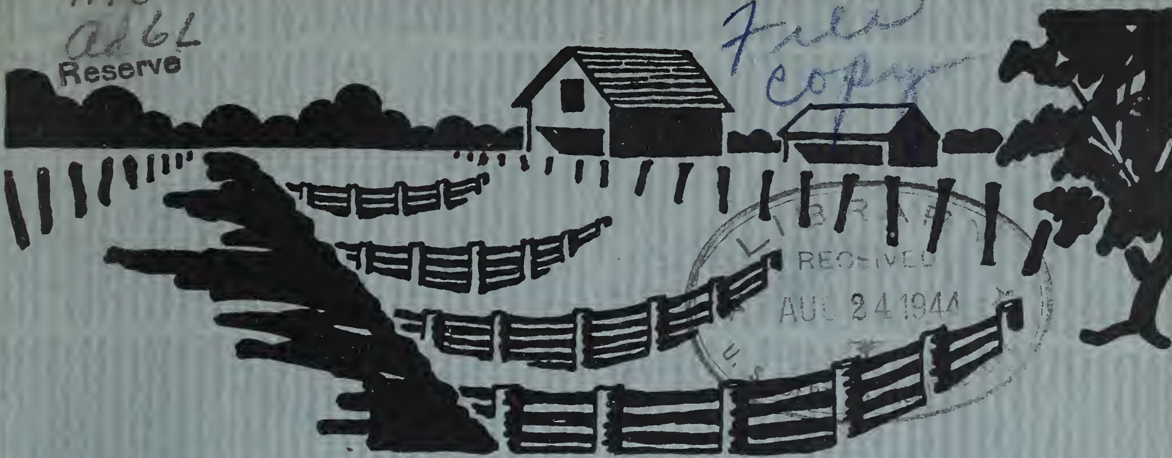

THE LAND
TODAY AND TOMORROW

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SOIL EROSION SERVICE
U. S. DEPARTMENT OF THE INTERIOR

THE LAND
TODAY AND TOMORROW

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Cover by the Pictorial Statistics Project of the Works Division, E R B, New York

WORK OF THE SOIL EROSION SERVICE

Gully Control in Louisiana

A deep, narrow gully cutting through a corn field near Heflin, Louisiana.

The same gully, effectively checked with an inexpensive log dam.

Nursery at Nakai Bito

a harbinger of tomorrow

By M. E. Musgrave

CHIEF OF RANGE STUDIES NAVAJO PROJECT

The old Navajo from Coyote Springs rose to address the chapter meeting. He raised his wrinkled face with its blind eyes and spread his arms dramatically. His voice quavered slightly as he spoke.

"Our land was once very beautiful," he said. "There were tall trees, many places. There was water in the streams where deer and other game came to drink. And there was grass, much tall, green grass waving in the wind. It was ni-zon-ih, very pretty."

He paused, while several of the older hearers nodded. Slowly he continued:

"Now, they tell me, all these things are gone. I can no longer see, but I know they speak the truth. The wind is hot and dry, and it is filled with sand. There is little grass left for the ponies. I can feel their ribs through the skin. It is very bad."

All were silent. None could voice a denial.

"It may be that we have caused these things, ourselves. We are told that we have too many ponies and too many sheep and goats. This means many hungry mouths eating on the grass and other plants. Very soon they're all gone."

Again a silence.

"But now," he continued more firmly, "it is going to be all right. These white men are going to help us. They will plant things and make them grow. Pretty soon, there will be much grass and many trees. It is good!"

As he seated himself, I thought upon his concise summary -- past, present, and future as we hoped it to be. How tremendous was this task which we had set ourselves, and how vitally necessary was its success! The future existence of the Navajos depended upon the rehabilitation of their ravaged lands, and time was of the utmost importance.

It was late in December, 1933, when the Navajo project was set up in a preliminary way. It then had been necessary to recruit trained men for the staff, and they, in turn, had to familiarize themselves with at least a part of the sixteen millions of acres of the Navajo project. It required time to attain these preparations and it was,

therefore, late in the spring of 1934 before any actual work was started. A lath awning, shading about one acre of ground, was erected at Nakai Bito to protect plantings of pinon *(Pinus edulis)*, winter fat *(Eurotia spp.)*, and other native stock. In addition, a few thousand willows and cottonwoods were planted up and down the Mexican Springs Wash. Due to the advanced season, only a relatively small amount of plant work was attempted. A total of perhaps 250,000 or 300,000 plants were set out last year.

Much planning and preparatory work was accomplished. A five-acre nursery site was terraced, leveled, bordered and planted. Nearly all of these plants were natives of the Southwest, and most were adapted

Variety? The Nakai Bito nursery included these plants -- a nucleus of the vegetative battle against erosion.

Yucca baileyii	*Yucca macrocarpa*
Penzia incana	*Euryops multifida*
Eragrostis curvula	*Oryzopsis milliaceae*
Quercus emoryii	*Ampelopsis quinquefolia*
Peach	*Blue plums*
Rhamnus	*Juglans nigra*
Atriplex confertifolia	*Crataegus erythropods*
Jujubus sp.	*Atriplex collina*
Sarcobatus vermiculatus	*Eriogonum sp.-Bush buckwheat*
Celtis reticulatus	*Cercocarpus intricatus*
Cercocarpus argenteus	*Acer sp.*
Rhus glabra	*Lygodesmia juncea*
Chilopsis linearis	*Cupressus arizonica*
Cowania stansburiana	*Elaeagnus angustifolia*
Eurotia lanata	*Fallugia paradoxa*
Fendlera rupicola	*Forestiera neomexicana*
Fraxinus cuspidata	*Gleditsia triacanthos*
Juglans major	*Odostemon fremontii*
Pinus edulis	*Pinus ponderosa*
Prunus americana	*Purshia tridentata*
Rhus trilobata	*Sambucus sp.*

to erosion control work in this semi-arid region.

In making plans for our revegetation work, we kept in mind the necessity for selecting plants which would not only serve as soil-binders and -builders, but which would provide food for man or beast, or both, for the problem of supporting more than 40,000 Navajos on 16,000,000 acres of badly depleted land necessitated increasing the human carrying capacity of the range.

Some of the most outstanding food-producing plants are the native peaches, plums, and berry bushes. The black walnut serves not only a dual but a quadruple purpose: providing firewood, building material, dye in the nut husks, and food. Pinon nuts and Emory oak

acorns are sold in the markets of the Southwest. Honey locust pods, yucca pods, sumach berries *(Rhus)*, and hawthorn berries form a part of the native diet, while other portions of the plants are used for various domestic purposes. For example, ash and oak wood are fashioned into the hard, glossy sticks used in rug weaving; and soap is made from the root of the yucca. Although the diet of these people is simple, their needs are, nevertheless, urgent; and we have, therefore, placed the emphasis on these food supplying plants both in the field and in nursery stock.

In addition to the nursery, prepared for seed planting, we selected an area with a favorable southern exposure, where will will handle plants that are brought in from various parts of the Southwest. The soil is a light sandy loam, especially adapted for this particular use, with enough natural moisture to obviate the necessity of artificial irrigation. We were fortunate in having a comparatively open winter, so we were not bothered to any great extent by frosts. This was particularly true in the heeling bed, with its southern exposure and favorable air drainage, where plants were being taken in and shipped out daily. We started planting such deciduous trees as cottonwoods, willows, wild plums, and tamarisk in early January, 1935, and have continued, with but few interruptions, until the present.

There has been a constant movement of plants at Nakai Bito, but when the total figures were made up on February 19, they were greater than might have been expected: Stock received at Nakai Bito (plus cuttings from tops), 1,149,120; Dispersed, 101,530; Planted at Nakai Bito, 604,650; Heeled, 361,540; Nursery, 81,500.

Since my part of the work plan for the Navajo Experiment Station deals with human relationships, it was very pleasing for me to note the interest taken by the Navajos in this planting program. One man, a stone mason making $5.00 a day, quit his particular line of work to do planting work for us at $2.40 a day, because he wanted to learn how to take care of plants. The Navajo students have taken hold of the revegetation work with amazing aptitude, and within this short period of time we have developed young men so well trained that they are taking charge of big planting crews putting out thousands of plants daily.

Within one month and twenty days, in 1935, we have handled more than a million plants at Nakai Bito alone. This was perhaps a little more than half of the total plants handled on the Navajo project as a whole. We have great hopes and plans for the future. Each succeeding year should show ever-increasing results of our labors. If only a small percentage of our plantings should grow, they will make an appreciable difference. We hope that once more there will be "tall trees, much grass, and all will be ni-zo-nih."

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Control of Wind Erosion on the Southern High Plains

"Where the wind blows, anything short of eternal vigilance is gross neglect."

By H. H. Finnell

REGIONAL DIRECTOR DALHART PROJECT

In the establishment of a permanent wind erosion control system, a number of factors must go hand in hand. Of greatest importance, probably, is the necessity of maintaining a vegetative cover for the land. Since this involves the correction of agronomic mistakes now widespread among farmers, and since only the farmers themselves can correct these errors, this procedure can only be approached through demonstration and education.

Also, of great importance, is the introduction of moisture conservation practices which serve to aid the farmer in maintaining vegetation through drouthy periods.

As a general aid in lessening wind damage on both cultivated and pasture land, a road-side wind-break tree planting program affords an opportunity of considerable possibilities.

The several phases of wind erosion control, listed in the order of their relative importance, are as follows:

1. Utilization of erosion resisting crop residues.
2. Moisture conservation for maintenance of vegetation.
3. Employment of emergency cover crops.
4. Wind-break tree plantings.
5. Use of emergency tillage operations.

Residue utilization, moisture conservation, and tree plantings should be established features of every high plains farming system. These erosion prevention measures constitute an economic asset to a permanent and stabilized plains agriculture by making material additions to the productive efficiency and soil resource conservation. Emergency cover cropping and emergency tillage should be held in reserve as support for the permanent erosion prevention program, and should be resorted to only in cases of extremely unfavorable conditions.

No method of control which waits until wind erosion has begun can be effective or economical. Advance preparations against drouth hazards are absolutely essential. The ideal system requires, first, that

an erosion resisting type of vegetation be produced at every opportunity, and second, that the vegetative residues from these crops be left on the ground for erosion prevention until a sufficient store of soil moisture has been accumulated to assure the successful start of the next crop. To accomplish this the following procedure is being put into effect on the Dalhart demonstration area.

Where an erosion non-resisting crop is being grown, it is stripped at close intervals with an erosion resisting crop, such as sorghum or small grain. Farmers confining their production to sorghums and small grain do not need strip cropping to provide the desired type of residue material left after harvest, but need only to preserve and utilize wisely what they have in the ground. Extreme care is necessary to prevent the burning off of stubbles, the overgrazing of stalk fields and the overgrazing of growing crops. This deliberate destruction and misuse of protective residue coverings has directly caused more erosion than any other common practice followed in this area.

Gaps in a program of residue utilization are most likely to occur during periods of extended drouth. To avoid crop failures, moisture conservation by terracing and contour tillage provides a most effective supporting phase for the continuance of the vegetative covering. Even when a grain failure occurs, the crop usually will have developed sufficiently to provide protection from erosion. Such other gaps as may occur, due to unfavorable conditions, may be closed by the use of emergency cover crops. These off-season plantings are made with no intention of economical production, being often too late for grain maturity, but are intended solely to provide ground cover.

Wind-break plantings of honey locust, Russian mulberry, Chinese elm, green ash, apricot, and other hardy plains varieties of trees, are being made in natural and engineered sites favorable to the accumulation of excess water from adjacent areas. The best sites occur along road-ways where storm water collects in the ditch, soaking into the soil and providing the moisture supply necessary to enable trees to compete successfully for existence under plains conditions. These wind-breaks are being located with the approval of County Commissioners, and are planted only on the south and east sides of the road to avoid traffic-blocking snow drifts.

Scientific observations by plains experiment stations, including weather records, together with a wealth of supporting farmer experience, indicate a highly practical possibility of maintaining vegetative cover by a complete coordinated effort of advance preparation. Where this is done, tillage methods become unnecessary, and the objectionable expense of non-productive field operations can be avoided.

Fortunately, the continuous cropping and residue conservation

policies of the Soil Erosion Service wind erosion control program fit admirably into the best known systems of fertility conservation that have been worked out for the southern high plains area. Moisture conservation also adds materially both to economical production and the stability of plains agriculture while contributing its part to the continuance of vegetative cover. As worded by Dr. H. V. Geib, foster-parent of the Dalhart project, "Wind erosion control in the Panhandle is merely sound farming put into practice".

When the protective cover has been lost, there may be many months of drouth before an opportunity to restore it occurs. At once the farm becomes unproductive and the farmer frequently is financially unable to continue the unequal battle by means of tillage operations. Preparation for such bad times can only be made in good times; thus the heart of the educational program is to instill vigilance in the minds of the farmers. Where the wind blows, anything short of eternal vigilance is gross neglect.

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A worn-out, eroded field in South Carolina. It was cultivated for a number of years, until soil losses and declining production forced. Under the Soil Erosion Service program, this field will be returned to trees.

Pasture Development in Texas

By V. W. Woodman

CHIEF AGRONOMIST TEMPLE PROJECT

Many methods are being used to maintain Texas pastures in their productive state. Of these contouring is proving the most effective.

The Soil Erosion Experiment Stations, in various parts of the country, have provided ample data to indicate that a good cover of grass is one of nature's best means of combatting runoff rainwater and accompanying erosion. On most of our pasture land, however, the cover of vegetation is not adequate to bring about this highly desirable protection. During the long dry summers, common in this portion of Texas, most of our pastures are badly overgrazed, thereby becoming readily vulnerable to the ill effects of surface runoff.

It is realized, of course, that overgrazing is a mal-practice, but one that is rather strongly intrenched and which cannot be easily overcome. Most of the Texas ranges are overstocked. If we were to carry only the number of cattle, or other livestock, which should be readily accomodated on our pastures during the dry portions of the year, the numbers would have to be so drastically reduced below customary practices that the majority of the stock men could not subscribe to the program. It is evident that some system must be worked out whereby a satisfactory number of cattle can be grazed throughout the dry months without seriously affecting the protective grass cover of the land that is essential in preventing destructive erosion. The land, assuredly, must be preserved for permanent pasture use.

A practice which would be highly beneficial on most of our pastures is that of rotating the fields. To do this, it would probably be necessary to construct a great many more fences than now exist, in order that cattle might be transferred from field to field as needs might appear. This practice would not only produce more pasturage, but would afford the advantage of permitting grasses, on selected fields, to recover sufficiently at the proper season of the year, to produce seed. When this practice is not followed, the pasture will soon become over-run with weeds, and much of the valuable grasses will disappear, leaving a large percentage of the land entirely bare. This is what has actually been happening over extensive areas in Texas.

Another practice which should be followed more diligently and which is applicable, certainly, to those sections of the state where mixed farming is being carried on, is that of raising feed to supplement the pastures during dry seasons. When this is done, the stock can be kept off the pasture fields at critical times when the grass is short and making no growth, and when grazing would be very harmful. Trench silos are cheaply constructed and are entirely satisfactory for storing and preserving ensilage, and supplies can be carried as much as two years, or even longer if necessary. While this practice is not yet general throughout the state, it has been adopted by a sufficient number of livestock men to demonstrate its value. It should go into general use.

On pasture land having any appreciable degree of slope, a large amount of the rainfall will induce serious runoff during seasons when the grass cover is light and where grazing has been heavy. If artificial means were adopted to hold more of the rainfall on the land and effect its penetration into the soil, it would be possible to produce a much greater amount of pasture growth, and, also, control soil loss and prevent serious pasture deterioration.

On the Soil Erosion Service projects in Texas, contouring of pastures is proving most effective. On the Elm Creek project, a considerable amount of steep submarginal land has been taken out of cultivation and planted to pasture grasses. The native grasses in this region consist largely of Andropogons, such as the big and the little blue stem, beard grass, and in places, considerable buffalo grass *(Bulbilis dactyloides)*. Most of these grasses seed so sparsely and the seed shatter out so early that it has been almost impossible to obtain sufficient seed from the species to establish new pastures. We are now working on new systems of collecting seed, and we hope it may be possible to perfect practical methods that can be put into general use.

At present, most of our pasture work consists of setting Bermuda grass or Buffalo grass sod and supplementing these with seed of Rescue grass, Rye grass, Dallis grass, Black medic and Bur Clover. Black medic cannot yet be recommended as entirely practical for the Blackland region. Dallis grass, also, has its limitations because of its lack of adaptability to long, droughty periods.

In setting out new pastures, it is usually the practice to run contour lines at 10-foot horizontal intervals and furrow them out. On land that is fairly regular, these lines are run at 20-foot intervals and the intermediate line is obtained by plowing a furrow about midway between the two lines that have been run accurately with the level. Where Bermuda grass is to be planted, the customary method is to

plow one round with a long mold-board plow, forming a single back-furrow on each contour line. The Bermuda sod is then placed in the furrow on the upper side of the contour. Another round is then made with the plow, which covers the sod and makes the back furrow still higher. If the ground is lumpy or very loose, it is compacted over the sod by means of a roller or with a dual-wheel truck. The sod planted on the upper side of this contour ridge will obtain more moisture than if planted in any other way. If the compacting process destroys the contour ridge it will be necessary to make another round with the contouring plow. We found that in order to get a satisfactory stand from Dallis grass seed, it is necessary to plant the seed in a water furrow on the contour and cover very lightly. Mixing the seed with well pulverized barnyard manure, and putting this manure in bunches in water furrows, has also proven a successful method of getting Dallis grass started.

Where pastures are being planted on hillsides that are extremely low in plant food, and there is doubt as to whether the grasses will survive and spread satisfactorily, it is advisable to apply some treatment of fertilizer before the grass is planted. Barnyard manure or a commercial fertilizer may be used. In order to accomplish a complete coverage of grass as early as possible, it is advisable to plant an additional row of sod between the ten-foot contours. This may be done by opening a single furrow midway between the contour lines, dropping the sod into this, and covering it over with another plow furrow. It is sometimes desirable to place the contours as close as five feet, especially when new pastures are being developed. If this is done, the water is held more nearly where it falls. The objection to this practice is that it adds to the difficulty of clipping weeds while the grass is becoming established. Where the contours are as much as ten feet apart, it is much easier to operate a mower effectively over the field. Very little grazing should be allowed on new pastures until the grass becomes firmly established.

Some very good contouring has been done with a farmall tractor and two-row lister. Pastures of Buffalo grass were bedded at three foot intervals just as though corn or cotton were to be planted, and before the season had closed the furrows had become entirely covered with grass. There was as much pasturage afforded for the season as would have been the case if the pasture had not been disturbed, because an improved condition in the moisture supply induced an extra growth of the grass. During the following season, this particular pasture carried twice as many cattle as an adjoining pasture which had not been treated.

Where old pastures are to be improved and the contours placed at

10-foot intervals, the owner of the land may object on the ground that it would destroy too much grass. In such cases, it may be advisable to place the contours at 20-foot intervals, and when the furrows become covered with grass during the following season, the intermediate contour may be plowed in with the owner's full approval and consent. The contour treatment destroys a small percentage of the grass in any one season, and it produces large benefits of improved quality and quantity of grass the second year. Pasturage destroyed by the additional contours, therefore, cannot be a serious handicap.

Many of the old pastures, located on badly eroded fields once cultivated, but now abandoned, have such a small portion of the surface in grass that it is necessary to set out new pastures at the time the land is contoured. When this is the case, the practice is very similar to that used in setting out entirely new pastures.

On pasture land where there are gullies, or even slightly depressed waterways, it is important that the contour furrows be turned upward within three or four feet of the edge of the waterway, rather than cross in a straight line. Thus the water is carried away from the old established waterway and conserved rather than lost.

Where the old established waterways are quite broad, it would no doubt be beneficial to plow separate contours across the waterways. In some cases, it would be advisable to construct these in the form of an inverted U and thereby set up a plan to direct the water out of the waterways into the main contours. It is best, in most cases, for these furrows to be independent, rather than a part of the main contours.

Where pastures have quite a steep slope, it is usually preferable to build terraces. These terraces should, under most conditions, be built on the level, so that all or nearly all of the water will be held on the land. To get best results, they should be placed rather closely, in which case they need not be built quite so high. This, of course, becomes similar to contouring, the two methods blending under many conditions. Sometimes it is preferable to combine the practices of terracing and contouring, by building the terraces at regular intervals, and contouring at 10-foot intervals between terraces. This is especially desirable on steeper slopes.

Where there is a cultivated field immediately below a pasture, subject to possible damage by runoff from above, it would be advisable to construct protecting terraces on the pasture area.

In many cases where pastures adjoin cultivated land, it is possible to empty terraces onto the pastures. This supplies extra water for the grass, and may also relieve the necessity for extra outlet protection. In the Texas Blacklands, however, due to excessive crack-

ing of the soil during dry seasons even on well vegetated areas, great caution must be exercised in dumping excess water on pastures.

If pastures are properly contoured or terraced, and are not unduly overgrazed, all of the rainwater which falls on the land can be held there. The practice will result in better pasture growth and will, also, give almost complete protection from soil erosion. The same methods can be applied to all land except that which is excessively steep or rocky. It should be the aim of every livestock man to adopt this improved pasture treatment, to the end of attaining better grazing and a better protection of his land.

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BOULDER DAM BED MAPPED TO RECORD SILTING

As an important step in protecting Boulder Reservoir from destructive sedimentation, Dr. W. C. Lowdermilk, Vice-Director of the Soil Erosion Service, has announced plans for maintaining a constant check on the amount of silt and other erosional debris deposited in the huge water storage plant by the Colorado River and its tributaries.

The Service, in cooperation with the Reclamation Service and the Coast and Geodetic Survey, will begin at once the work of mapping the 230 square miles to be inundated behind Boulder Dam. When completed, this map showing original contours of the reservoir bottom will form the basis for future comparative studies to determine changes in the topography of the lake floor due to deposits of sediment.

The information thus obtained will furnish a factual basis for developing protective measures of erosion-control and silt-detention in the watershed of the Colorado River.

Onth basis of present estimates, it would require about 100 years to fill the 10,000,000 acre feet designed for silt retention and less than 500 years to fill the gigantic reservoir completely.

"The Boulder Dam development, with its far-reaching effect on social welfare in the arid West, must be considered as a permanent alteration in the physiography of the United States," Dr. Lowdermilk declared.

"Although there appears to be little danger that silt deposits will seriously damage the reservoir at least within the next hundred years", he stated, "a proper concept of Boulder Dam demands that steps be taken now to prevent any future curtailment of its utility."

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Frost Must Share the Blame

That chilly nights often injure crops is well-known — but how about the soil itself?

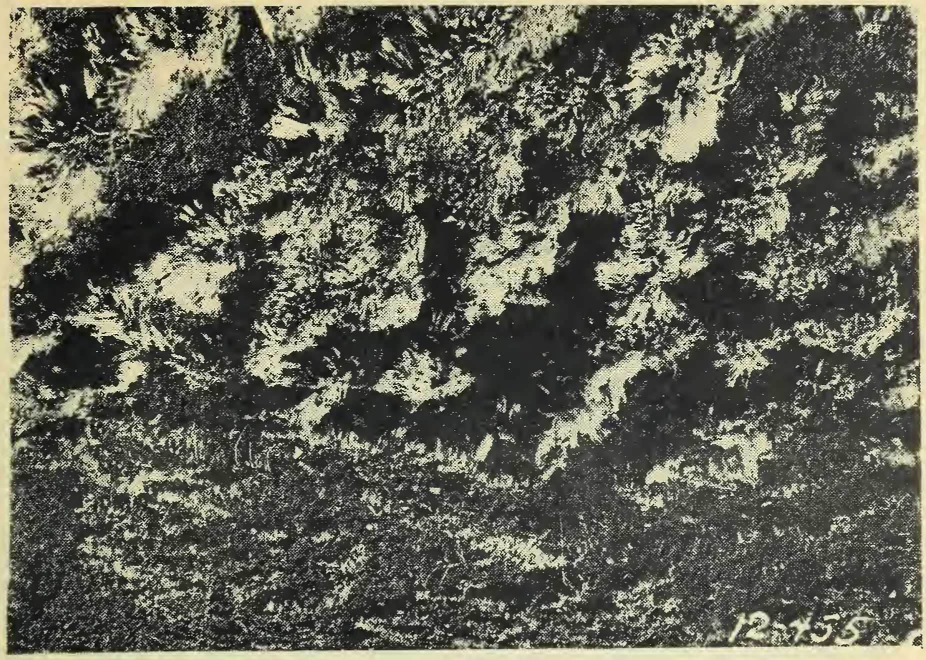
By W. D. Lee

CHIEF SOIL EXPERT HIGH POINT PROJECT

Throughout the southern Piedmont and Appalachian regions during winter and early spring odd ice formations may be observed on exposed road cuts or ditch banks. The peculiar finger-like crystals have apparently grown at right angles to the surface, regardless of the degree of slope. This freezing phenomenon is locally known as "ground-ice" or "jack frost". It is a modified form of soil-heaving, and takes place where the moisture content of the soil is high. The ice-columns, or needle-like crystals, are formed at or near the surface without penetrating the lower depths of the soil. During the formation of the ice crystals, unfrozen water is drawn to them by capillary or film movement from the soil. The growth takes place at the lower end, directly in contact with the soil, and the process forces the entire column upward, simulating straight needles massed together. Observation will show that each ice column is capped by soil particles.

In the southeast, this type of frost action is confined principally to heavy clay soils. It differs from the true "heaving" so often encountered in the highly organic soils of the north central states, where several inches of frozen soil may be lifted by the formation of ice crystals at lower depths. The clay soils of the Piedmont are often affected, especially on "galled spots" representing exposures of subsoil clays in tilled fields, or in gullies or road cuts. Occasionally, a loam or clay loam will show some heaving, but this occurs only where the heavier clay is immediately below the surface. On recently made road cuts in deep clay loam soils, ground-ice crystals may not be readily noticeable above the subsoil. The three conditions essential to the formation of ground-ice are, therefore, heavy-textured soils, moisture, and absence of cover. Clay soils retain more moisture than loams or sandy loams. In the smaller pore spaces, water freezes more readily, and capillary movement is much stronger. A good vegetative cover prevents formation of ground-ice.

The question has arisen: "What ill effects are caused by repeated frost (ground-ice) action?" The answer: severe sheet erosion on gullied areas and in cultivated fields of clay soils; gravitational erosion in deep gullies, road cuts, and ditch banks. On open fields and



Minute evidence of "frost erosion".

the smoother parts of gullied areas, the heavy clays are thoroughly pulverized to a depth of one to three inches by the action of the ice crystals. Upon thawing, this layer dries very quickly. The resultant condition is an inch or two of incoherent, loose powder-like soil resting upon an almost impervious clay. When rain falls, this loose material practically melts away with surface runoff, and another inch or two of good topsoil is lost from the field. On the sides of deep gullies, or road cuts, or ditch banks, the loosened clay material tumbles down, on thawing. When a warm day follows a sharp freeze, as much as two inches of this loosened material may roll downward. This accumulated debris in the bottom of gullies or ditches is carried away by the first outflow of water following a heavy rain. Much cutting-back and caving-in is caused by this repeated process. Where there is sufficient seepage to supply moisture to the lower clay subsoil, ground-ice action continues and severe cave-ins carry the banks back many feet each year.

Control measures, such as planting or seeding on gullies, road cuts, and other severely eroded areas, are often greatly retarded by frost action. Roots of grasses and other seeded plants may be destroyed by the work of ground-ice. Well-set trees may be loosened, or the roots exposed, when material repeatedly disturbed by ice crystal formation is carried away. Heavy mulching is probably essential for

control in many cases. Where heaving takes place in grain fields, the damage is generally inversely proportional to the amount of root growth. Seeding as early as possible, and use of fertilizer to produce vigorous growth and well-developed roots, will lessen winter killing. Plants with deep and well-spread root systems will not be easily lifted out of the ground by ice action. If such lifting does occur the chances are greater that the plants will be supplied with moisture until new growth begins in spring. Here, again, use of stable manure or other litter as a mulch will check serious damage.

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DUST STORMS AFFORD GRIM OBJECT LESSON

The intense dust storm which swept across the mid-west in February is a grim object lesson in the destructive power of wind erosion and a graphic illustration of the imperative need for its control, according to Director H. H. Bennett.

Continued storms of this sort can be expected, he asserted, until adequate steps to prevent their recurrence are taken by farmers in the great plains region where the topography of the land and improper farming methods make soil-blowing a constant menace.

Approximately 60,000,000 acres of land in the arid region of the United States have suffered severe damage from wind erosion, according to a recent survey by the Soil Frosion Service. About 5,000,000 acres have been completely destroyed for any possible cropping purposes by the loss of topsoil or by the deposition of wind-blown sand on fertile areas.

Dust storms, Mr. Bennett stated, can be averted to a large extent by the maintenance of an adequate cover of vegetation on the ground and by scientific and practical methods of cultivation.

At Dalhart, Texas, in the Panhandle region where the most recent dust disturbance originated, the Soil Erosion Service is now conducting an actual demonstration of the most effective measures of wind erosion control. Similar projects have just been launched in Eastern Colorado and central South Dakota. Application of the land use methods employed by the Service in these demonstration areas to the general regions affected by wind erosion, Mr. Bennett declared, will curb the recurrence of soil disturbances caused by high winds.

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Kudzu for Erosion Control

By R. Y. Bailey

REGIONAL DIRECTOR ALABAMA PROJECT

With the emphasis that is being placed on vegetation as a means of erosion control, the question of what to plant for this purpose becomes one of major importance. As a general principle, no plant should be used which will not produce something of value to the owner of the land. With the possible exception of sod used in terrace outlets, all plantings made for erosion control will be appreciated by farmers in direct proportion to their usefulness for other purposes. Shrubs or vines that merely stabilize gullies, but have no value as forage or timber will not add materially to the popularity of erosion control work. If, on the other hand, the plants used satisfy a definite need on the farms, they will serve to popularize the work with farmers and land owners.

Kudzu is probably the most useful plant for erosion control in the Piedmont section of the Southeast. This plant is a perennial viny legume which grows vigorously on practically all types of soil found in the Piedmont section.

The value of kudzu for erosion control is due in large measure to its habits of growth. Runners grow to a length of as much as 50 or 60 feet. These runners take root at the nodes and establish new plants. This is a very important characteristic where kudzu is to be used for gully control or for covering badly eroded areas along shallow gullies where the topsoil has been washed away. The plants can be set in rich soil several feet away from the gully or bare area, as may be desired, and they will spread to the areas to be protected. Kudzu runners climb down vertical banks and even cross gullies, whereas the runners of most other viny plants tend to grow upward and, therefore, do not cover gullies as effectively. No other plant is available that can be depended upon to spread as far from the original plant.

Figure 1 shows an area of approximately three fourths of an acre, which was covered with a dense growth of kudzu from one plant started in the bottom of a deep gully about fifteen years before the picture was made. The gully, in which the man in the picture is standing, was approximately ten feet deep when the plant sprouted from an old vine thrown in the gully. This gully was on a type of Davidson soil which is very erodible, particularly in the B and C horizons. No bank slop-

Fig. 1. Kudzu started by throwing vines in a gully about 15 years before this photograph was made. The man is standing in the deepest part of the gully, which was originally approximately ten feet deep.

ing, check dams, or other mechanical means of control was used. Figure 2 shows the above gully in January when kudzu was dormant. It may be seen from this picture that the gully has not only been stabilized but that it has also been filled with accumulated vegetative and soil debris to such an extent that an automobile could be driven across it.

Kudzu has the further advantage of being a valuable forage plant. It is eaten readily in either the green or the cured state by all classes of livestock. The analysis of kudzu, given in Henry Morrison's "Feeds and Feeding", shows that it has approximately the same feeding value as alfalfa. This plant may be cut for hay at any time during its growth in the summer or fall, whereas other forage plants must be cut at the proper stage of development to avoid quality deterioration, or even serious loss.

Fig. 2. The same gully shown above, while the plants were dormant.

KUDZU NOT A PEST

There is an erroneous idea that kudzu may become a dangerous pest by spreading to cultivated land where it is not wanted. The manner in which new plants are formed precludes any possibility of this plant spreading to cultivated land. As previously stated, the runners take root at the nodes and form new plants. During the first season the roots of these new plants are fibrous and may be easily broken loose from the ground by a one-horse plow or cultivator, as ordinarily used in the cultivation of crops. Thus, if the cultivated field is plowed each year, there is no possibility of new plants, formed at the nodes of runners as described above, becoming sufficiently established to prevent being readily uprooted. At the Alabama Experiment Station, kudzu meadows and cultivated fields adjoin, with no physical barrier between, yet no extra labor or time is occasioned in keeping kudzu runners from spreading to the cultivated areas. Plowing done in the production of crops on the cultivated areas prevents the spread of kudzu to these areas.

HOW TO PLANT

Kudzu is propagated by plants. Only plants with well developed fleshy roots should be used. Care should be exercised in keeping plants moist from the time they are dug until they are set. If plants are allowed to dry before setting, a large percentage of them will fail to live and grow.

Various methods of planting have been used. A very satisfactory one is as follows: Lay off rows 8 to 12 feet apart and throw four furrows to each row to form a bed. Plant on top of these low beds, using a tree planting dibble to open holes for the plants. Be careful to get plants well into the ground so that the crowns will be approximately level with the surface of the ground after the soil is packed around them.

Fig. 3. Close-up view of kudzu planting. One man makes the holes with a tree planting dibble, one man drops plants behind two dibbles, and two men set plants behind each dibble.

Planting should be done during the dormant season, using care to protect any plants on hand from freezing while held in storage.

Little growth should be

expected during the first season. Plants must form a well developed root system before vigorous growth can begin. It is advisable to cultivate kudzu during the first year to control weeds and grasses. It is particularly important that weeds be kept down so that runners will be in contact with the ground and thus allow new plants to be formed at the nodes. If given clean cultivation during the first season, kudzu should become sufficiently established to compete with other plants the second year, and thereafter.

WHERE KUDZU MAY BE USED

Gullies. Gullies which are not to be used as terrace outlet channels may be stabilized by first diverting the water from them and then planting kudzu along the banks where soil is available. These plants will require about two years to become well established, but after they are established, they will produce vigorous runners that will cross the gullies, take root at the nodes, and eventually stabilize the gullies. Where check dams have been built in gullies and have collected soil, kudzu plants may be set in this soil.

Plants set in bare B or C material in gullies will require several years to get sufficiently established to make satisfactory growth.

Land unfit for cultivation. On slopes that are too steep or too badly eroded for profitable crop production kudzu may be set in rows over the entire area. In addition to giving a protective cover for such land, kudzu will, after it is well established, produce a crop of good hay.

On fairly gentle slopes where the land is too badly eroded to be terraced and cultivated, kudzu will enrich the soil in a few years to an extent that it will again produce crops.

Provision should be made to get a row or two of corn and velvet beans, cowpeas, or soy beans planted between the rows of kudzu the first season to insure a certain amount of necessary cultivation.

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PLANT DISEASE AND PESTS SPREAD BY EROSION

A new and menacing aspect of the erosion problem has been discovered in the rapid spread of plant disease and weed pests in certain sections of the West. Soil washed from eroding and disease-infected slopes is carrying infection to lower lands which, because of their more resistant character, have hitherto been unaffected, according to a report recently submitted to Vice-Director W. C. Lowdermilk from Ventura, California, county agents.

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Collection of Hydrological Data

By D. B. Krimgold

ASSISTANT AGRICULTURAL ENGINEER

When intelligent control of any phenomenon is attempted it is always necessary first of all to determine the factors influencing it. These factors are then studied and the direction and magnitude of their influence is determined. The control of a phenomenon may consist in retarding or accelerating its rate or it may aim to eliminate it entirely.

Soil erosion is a natural phenomenon, the rate of which in the United States has been greatly accelerated by such unwise practices as deforestation, overgrazing, and faulty agricultural practices.

The task of the Soil Erosion Service is the retardation of the rate of soil erosion and the restoration of its geological norms, thus alleviating such grave consequences of accelerated erosion as depletion of valuable topsoil from agricultural land, the destruction of large tracts of land by gullying, and the silting of expensive artificial reservoirs and irrigation canals and structures. By-products of the work of the Service should be the replenishing of ground water and the diminishing of flood peaks.

Soil erosion is an extremely complex phenomenon. The factors influencing it are themselves quite complex in nature and so closely interrelated that it is virtually impossible to segregate them and treat each of them independently of the others.

Sheet erosion is known to be a function of intensity of precipitation but one can not discuss the effect of this factor in any specific case without knowing a number of other factors such as the type of soil involved, the magnitude of the slope, the type and density of the vegetative cover, and a number of hydrological factors. Gully erosion is dependent on such characteristics of stream flow as rate of discharge, velocity, silt content -- but can one discuss the extent of gully erosion without knowing the texture and structure of the soil composing the banks and bed of the gully in question?

Neither is wind erosion determined by wind alone. It is obvious then that to effectively control soil erosion, due consideration must be given to a multitude of widely varied factors.

The engineering branch when deciding on a type of terrace to be used on a given farm may have to consult the soils branch with regards to the type of soil and its properties; the agronomy branch with regards to the crops to be grown and the methods of cultivation; and the forestry branch with regards to the types of vegetation to be used in controlling the terrace outlets. Each of the branches named may in turn have to consult all or some of the other branches to furnish the best answer to the problem. There is one type of information which is always indispensable to all branches of the Service when they try to give an answer to the problems arising in every day work, and this is the hydrological data for the locality involved.

When an engineer designs a terrace, culvert, spillway, check dam, or interception ditch, he invariably faces the problem of determining the maximum rate of flow and the frequency of its occurrence. The determination of these all-important unknowns involves the knowledge of such hydrological factors as intensity, duration, seasonal distribution, and frequency of occurrence of rainfall, rates of infiltration, and a number of other related factors. When the agronomist chooses a crop to be grown he must have such information as: length of growing season, the amount of available precipitation and its seasonal distribution, maximum and minimum temperatures, hours of sunshine and other factors. The forester and the range management men when dealing with ecological problems must know the annual precipitation and its distribution with elevation; they may also have to know the rates of transpiration of various species; they may need data on the maximum wind velocities. Even the soils man is vitally concerned with such data as evaporation from soils, total precipitation, rates of infiltration, depth of the water table, or the rate of flow of water and velocity distributions in a gully when he attempts to determine the comparative resistance of different soils to erosion.

For the Service as a whole, hydrological data are useful in many ways. It is essential that some means be available by which to show the effectiveness of the work as it progresses. This can be shown by determining the silt and water runoff from a given area before and after control measures have been applied. In a similar way the necessity of control and the benefits derived from it may be shown. The relative value of different control measures can be determined. It is, of course, understood that all related meteorlogical and other factors are to be determined before conclusions are reached. Gaging the water and silt runoff together with analyses of the silt for organic matter are useful in sounding a warning to farmers whose good topsoil is being washed away without any visible effects on the land. It seems to the author that this warning should be an important part of the activ-

ities of the Soil Erosion Service. Man's activities can be highly effective in accelerating erosion but not as effective in restoring depleted top soil to its original value. A few inches of good rich topsoil represents hundreds of years of slow work by nature through such slow processes as decay of vegetative matter and bacterial activity.

Soil erosion control is a new field and consequently there are a great many problems to which the answer is yet to be found. One such problem to be answered in connection with gully control, for instance, is whether the erosive power of a stream increases or decreases with an increase in its suspended silt load. Many of these problems are being studied by first rate investigators in hydraulic laboratories in this country and abroad. However, results of laboratory studies on such subjects as silt transportation and erosion are greatly in need of verification in the field. The nature of the work of the Service and the wide geographic distribution of its projects make it the most logical agency to verify under actual natural conditions the results obtained in the laboratories. On the other hand there are many problems which are of interest to the Soil Erosion Service only. The laboratory and field investigation of such problems must be undertaken by the Service if it is to carry out its work on a rational scientific basis. An example of such investigations are the experimental plot studies, part of which is the laboratory study of the various types of divisors used to measure runoff from the experimental plots. This study is being carried on by Howard L. Cook, Hydraulic Engineer of the Service, in the Bureau of Standards' hydraulic laboratory. On at least one of the projects, the Gila, the object of the work is to reduce the silting of reservoirs and irrigation structures. There it is important to know whether gully erosion or sheet erosion contributes the greatest amount of silt. Such a problem can be solved only by determining the amount of material carried by the stream at appropriately located sections.

Reliable hydrological data needed for the solution of this and kindred problems can be obtained by careful observation and skillful analysis of the data collected.

Some of the Soil Erosion Service projects are located in regions for which some hydrological information may be obtained from Federal and state agencies such as the United States Weather Bureau, the United States Geological Survey, the Army Engineers, State colleges, and others. However, in most cases the data available were collected with objectives other than erosion control in view, and therefore give only a partial answer to problems confronting the Service.

Director H. H. Bennett and Vice-Director W. C. Lowdermilk realized at the very start that soil erosion is largely a hydrological

phenomenon and that collection of hydrological data must be made an important part of the work of the Service. Arrangements were made for the collection and study of such factors as stream discharge (both water and silt) and ground water studies on the projects. The first step in this direction was taken as far back as December, 1933, when a memorandum signed by Director Bennett was written to the Geological Survey concerning stream gaging and the collection of rainfall intensity data on eight of the Soil Erosion Service projects. In February 1934, ground water studies by the Geological Survey were added to the stream gaging on the eight projects. At that time a memorandum was also sent out to all regional directors instructing them to undertake ground water studies. The regional directors were well aware of the importance of this phase of the work and as a result some hydrological data are being collected on almost all of our projects. In some cases, such as where plot studies are being conducted, complete meteorlogical stations have been established.

Records of the Washington office show that by January 1, 1935, a total of 361 standard Weather Bureau rain gages, 64 recording rain gages, 39 water stage recorders, 1 barograph, 28 maxima and minima thermometers, 7 anemometers, and 8 psychrometers have been ordered for the various projects. The nature of the equipment listed indicates that a considerable amount of hydrological information is being obtained. These data will be of great value, provided a standard and uniform procedure is followed in collecting them. A few examples will illustrate the absolute necessity of standardization and uniformity.

It has been found by the Weather Bureau that objects in the vicinity of a standard rain gage have a marked effect on the amount of precipitation caught by the gage. A. F. Myer, in his book on hydrology, states that no objects near a gage should be within a distance equal or less than their height. It is known that the amount of rainfall caught by a rain gage varies with the elevation of the gage above the surface of the ground. At a height of 43 feet above the ground, only 75% of the rainfall was collected (Myer's Hydrology, P. 81).

Robert E. Horton has shown that an unshielded snow gage collected .43" out of a total of 1.41" during a snowstorm.

To get comparable evaporation data it is necessary to follow the standard procedure employed with a given type of pan. It would not do, for instance, to employ a U. S. Weather Bureau class A land pan and perch an anemometer on an 18 foot tower when it should be 6" above the pan.

The Weather Bureau maintains 6000 cooperative stations from which daily rainfall and temperature data are obtained. Each of these stations necessarily covers a wide territory. To assume that the rain-

fall is uniform over such wide ranges would be rather naive, at least in some parts of the United States.

Too often erroneous conclusions have been drawn based on rainfall data from such widely spaced stations. It is therefore imperative that the rain gages on the Soil Erosion Service areas be well distributed so that isohyetal maps showing the actual distribution of rainfall from a given storm can be drawn. Hours could be consumed in citing additional proof for the necessity of a standard and uniform procedure in collecting and recording hydrological data.

The importance of the records and the necessity of standardization has been fully recognized by Dr. Lowdermilk, who assigned the task of standardization and coordination of the collecting and recording of hydrological data collected on the Service projects to the writer. An all inclusive form for recording meteorological data has been devised which is suggestive to observers. A similar form is being devised for the gaging stations and for the ground water studies. Standard procedure to be followed in the installation of hydrological stations and in collecting the data will be established with due consideration given to the procedure employed by other hydrological agencies.

A memorandum will be sent to all regional directors requesting basic information about established stations. This information will be carefully studied and forms and procedures revised to fit those used by the various projects as much as possible. The writer will visit the projects in the course of his duties to become familiar with the specific conditions of the individual areas; he will assist the local men in their problems, and learn as much as possible from their experience. This procedure will enable an intelligent analysis of the data obtained.

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COMPREHENSIVE SOIL EROSION BIBLIOGRAPHY COMPILED

A complete bibliography on soil erosion, containing references to more than 1,160 sources of information, has been compiled by Miss Lillian H. Wieland, secretary to Director H. H. Bennett. The work, which Miss Wieland began in 1932, is believed to be the most comprehensive catalogue of soil erosion data ever compiled. Every source of information contained in the files of the Library of Congress, the Department of Agriculture, and the Soil Erosion Service, is listed in the 124-page document.

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Repeat Photography

By A.E. Burgess

LINDALE PROJECT

Nothing shows progressive benefits of a soil erosion control demonstration more effectively than follow-up pictures of an identical area before and after changes in land use practices have been made. It is not always easy, however, for the photographer to make an identical photo in point of field outline, for in some instances, no guiding landmarks remain to direct location when the surface cover is changed, save, perhaps, a fence post or a shrub or stump in the near-distance.

Of course, it is possible to make records of original locations based on compass readings, which would enable the photographer to return to the immediate vicinity, but which would not always be adequate for the exact location so necessary for a repeat photograph. Nor could stakes be driven for future use in the face of plows, tractors, graders and laborers.

I have found the following method very satisfactory in obtaining identical follow-up photos. Make a good record at the time of the first exposure, for future reference. Upon returning to the vicinity for a repeat pic ure, consult the "Photographic Record" slip which specifies "Photographer's Position". Set up the tripod as nearly as possible in accordance with this record; open up the camera shutter, focus the lens, and begin rotating the camera until some recognizable part of the original scene appears on the ground glass. Then consult a print of the original shot and select a post, or bush, or tree, or other object as near the center of the original photo as possible.

Move the camera tripod forward or backward as may be needed, until the object chosen shows the same size on the ground glass as on the print. The camera will then be at the same distance from the object chosen as in the original photo. Level the camera and place the print upside down on the ground glass above the object. Rotate the camera until the point of reference chosen shows on the ground glass in exactly the same vertical position as on the print.

Lock the camera in place on the tripod, raise or lower the front until the skyline is exactly the same height on the ground glass as on the print. You are now ready to make a follow-up which will duplicate exactly the field originally covered.

Occasionally, it will be found better not to take an identical

Pasture near Lindale, Texas. Camera 169 feet due NE of large red oak tree shown. Brush in photo has been piled for burning.

view, but one closer up or farther away. In that case, choose some object which is in the center of the original, put it in the center of the ground glass, and let other objects fall where they may.

Same pasture as above, after contouring. A follow-up photograph.

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more about

The Rate of Grazing

By Lyman Carrier

CHIEF OF THE BRANCH OF AGRONOMY

It is impossible for me to pass unnoticed the challenge issued by Robt. V. Boyle in his article, "Overgrazing - A Reality" in the February issue of *"The Land: Today and Tomorrow"*. It is regrettable, I feel, that Mr. Boyle's evident misinterpretation of my earlier article on overgrazing prompted him to dispute my position. For, in everything I have written on pasture management in the past twenty-five years, I have tried to make clear the fact that I was discussing the grazing lands of the humid regions of the United States. It seems, however, that this is not enough. Silence, complete and absolute, appears to be the only condition which will stop the bull from chasing an imaginary red flag.

It has been my pleasure and privilege to know quite a few "Western Ranchers". My opinion is, that as a class, they are neither so ignorant nor narrow-minded as to resent a discussion of the care of humid pastures even when the practices advocated therefor differ from those best suited to dry land conditions.

The grazing lands of the humid regions constitute a large item in the list of our national resources. As the Soil Erosion Service is causing a considerable acreage of formerly tilled land to be rededicated to permanent grass, and as the kind of turf which makes the best grazing is the kind of turf which is most useful for stopping soil erosion, it seems imperative that we give the owners of these pastures the best instructions available as to their care and maintenance. It should be noted that one acre of humid pasture land is the equivalent in producing power of at least 30 acres of the Navajo, and 50 acres is probably more nearly correct. I must, therefore, continue to advocate "close even grazing"[1] for eastern pastures although it may be a discordant note in the western overgrazing chorus.

Mr. Boyle asks whether my recommendation for grazing bluegrass is "based on scientific research or if it is merely empirical." Let the facts speak in answer. From 1908 to 1914 inclusive the writer conducted a series of pasture experiments at the Virginia Experiment Station, Blacksburg, Virginia, on the typical bluegrass sod of that locality. One of the experiments consisted of two fields, one grazed at the usual rate for that region, the other just twice as heavily. This was continued for five years. Grazing was continuous from May to October.

No lime or fertilizer was applied. The heavily grazed sward, grazed to about two inches in height, steadily improved in quality; that of the lightly grazed field deteriorated. Moreover, each of the animals in the heavily grazed field made practically the same gain as the one that had double the area to feed over. Since then, I have seen an abundance of evidence bearing on the subject and it all confirms the results of that experiment. In an excellent bulletin recently issued by the Ohio Extension Service, it is recommended, for rotation grazing, that the grass be allowed to grow to four inches. (See Fig. 1).

New England in the early part of the nineteenth century had a large livestock industry, mainly sheep and cattle. Both the soil and climate of New England are especially suitable for growing grass. For economic reasons, due largely to heavy costs of winter feeding, this livestock industry passed out with the exception of some intensive dairying. One can find in New England all rates of grazing from heavily stocked dairy farms to complete abandonment. I have inspected thousands of acres of these pastures and if there is any evidence that light grazing improves the sward, I have failed to see it.

A few years ago an investigator, who had spent some time on the western ranges, made a trip to New England. He returned to Washington and wrote a bulletin, the burden of which was that New England pastures had been ruined by overgrazing. To prove his contentions he illustrated the bulletin with views of poor, weedy hillsides that probably had not had an animal larger than a cotton-tail rabbit on them in twenty years.

The writer once kept, for two years, a pure stand of Kentucky blue-grass clipped to three-eighths of an inch in height. To do this, it was necessary to use a golf putting-green mower and cut it four to six times a week during the growing season. There was a hundred percent coverage of the ground at all times. This may or may not prove anything, but it does indicate that there may be other factors involved in a poor blue-grass pasture besides overgrazing. (See Fig. 2).

The bluegrass pastures of the middle west are usually dry, brown, and bare in July and August. Most everyone who sees these pastures at that time will say that they are overgrazed. It has been my observation, that even there, pasture turf carrying one animal unit to seven or eight acres is not so good as that grazed twice as heavily. When all grazing is stopped, bluegrass and white clover, the two most valuable pasture plants will, except on the most fertile soils, disappear entirely from the turf. It will take something besides reducing the number of grazing animals to improve the midwest pastures.

Mr. Boyle correctly points out that heavy grazing has in some cases on the western ranges caused the sod forming perennial grasses to

Fig. 1. The Hinman pasture at Cornell University. In 1932 it carried 10 two year old steers from June 1 to July 31 only. In May 1933 it received 600 lbs. superphosphate per acre and the 30 acre field was divided into 4 fields which were grazed in rotation. In 1934 the field carried 20 Angus cows, 5 two year old heifers, 1 bull and 15 calves born on pasture, from May 6 to November 1. The stock received nothing but pasture herbage and the 5 heifers were fat enough for immediate slaughter in October. The pasture now carries a close sward of Kentucky blue grass and wild white clover. The herbage is not allowed to exceed 4 inches in height. Ungrazed herbage is cut very closely with a mowing machine once during the grazing season.

--D.B.Johnstone-Wallace,
Agrostologist, Cornell University.

Fig. 2. A Guernsey cow which holds a world's record, grazing a pasture in Columbia County, New York, which has been improved by superphosphate and close grazing.

--D.B.Johnstone-Wallace,
Agrostologist, Cornell University.

replace the annual bunch grass vegetation. It has also been demonstrated on some of the western range lands that where grazing is controlled, the animals properly distributed, and provision made by deferred or seasonal grazing for reseeding of the more valuable species of plants that a larger number of animals can be carried than it took to destroy the original vegetation. By what process of reasoning can it be claimed, in such a case, that the range was ruined by overgrazing? The point which I tried to make in my previous article, and which I will repeat here is: It is impossible to discover a correct remedy with a wrong diagnosis of the ailment. Asserting that pastures are overgrazed when the trouble is lack of fertility, improper distribution of the animals, absence of the best species of plants, or not making provision for the plants to reseed themselves, has never made two blades of grass grow where none grew before.

The cry of overgrazing has been raised in an ever increasing volume for the past thirty years to my personal knowledge. Little, however, has been done about it except on the controlled range lands of the National Forests. Little will continue to be done about it until better range and pasture management practices are worked out and we have something to offer the graziers that is more attractive than a reduced income. Wringing our hands and working ourselves into a frenzy over the "scourge of overgrazing" will not bring about an improvement of grazing conditions in this country.

I believe I am not over-stating the case when I say the propaganda about overgrazing originating on the western ranges has been more harmful to the handling of eastern pastures than it has been beneficial to the range country. Telling a man he is overgrazing his pastures raises the false hope that he may, by merely reducing the number of animals, bring about a desired improvement. In most cases in the east that is not what happens.

Constructive articles dealing with range or pasture management and limited in application to the sections of the country with which the investigator is familiar will accomplish more than long range criticism of something which he does not understand. Let us strive for the proper handling of our grazing lands wherever they may be located and let us not cite moving pictures of foreign scenes as scientific data. The cameraman might see it and hurt himself laughing. This must stop or the flag may be accused of trying to chase the bull.

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Value of Roadside Signs

By E. H. Aicher

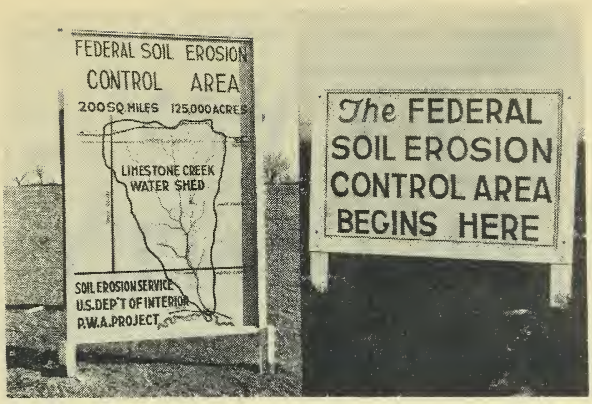
CHIEF SOIL EXPERT MANKATO PROJECT

Properly prepared roadside signs can be of great value in calling the attention of the public to Soil Erosion Service areas and demonstrations being conducted. Many people from various sections of the United States pass through the areas constantly. Unless their attention is called to the projects and to the important phases of the demonstrations under way they will have little conception of the work. The future attitude of the public to soil erosion activity will depend upon what the people know about it. Advantage should be taken of every opportunity to acquaint the public with the type of work this service is conducting. Effective signs telling the people of soil erosion control work are just as essential as signs calling attention to other Federal or private activities.

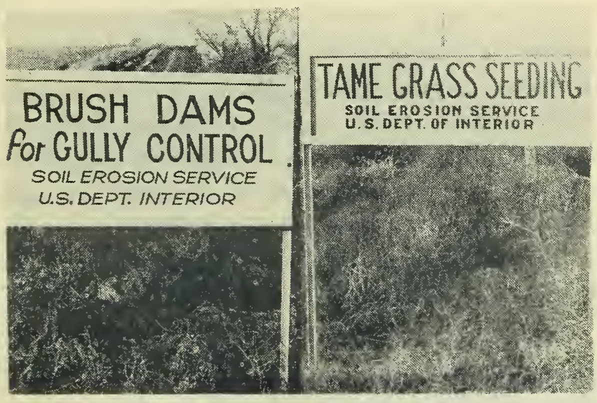
In the Limestone Area in Kansas, a large number of roadside signs are being used to good advantage. These not only define the area for tourists who pass through, but call attention to demonstrations along the highways.

The signs which define the area consist of twc sets. One set of three, six feet by eight feet, show a map of the area and give the size of the project. One of these is set on either side of the area on U. S. Highway No. 36 and one on U. S. Highway No. 40N, where this highway touches the southern border of the area. The second set, consisting of four signs, fcur feet by six feet, are placed at points where main highways cross the project borders. These signs read "The Federal Soil Erosion Project Begins Here". One is placed on either side of the area on U. S. Highway No. 36, and one on Kansas Highway No. 28 on the north border of the area. The fourth is located on U. S. Highway No. 40N and reads "Federal Soil Erosion Project, Southern Border".

In addition to these large signs there are numerous smaller ones calling attention to individual demonstrations. These have to do with terracing, contour farming, gully control, tame grass and alfalfa seeding, pasture contouring, interception ditches, terrace outlets, and similar activities. Certain of these signs aided materially in putting over locally the idea of contour farming and created interest in all phases of the program. Many of them were placed at farms where demonstration meetings were held. In short, the subject matter signs are considered to be of greatest value in this area.



These signs show "where the work begins" in Kansas.



Interested visitors are given an eyeful.

Two more phases of the work are pointed out.

BY WAY *of* BIOGRAPHY

F. A. Fisher

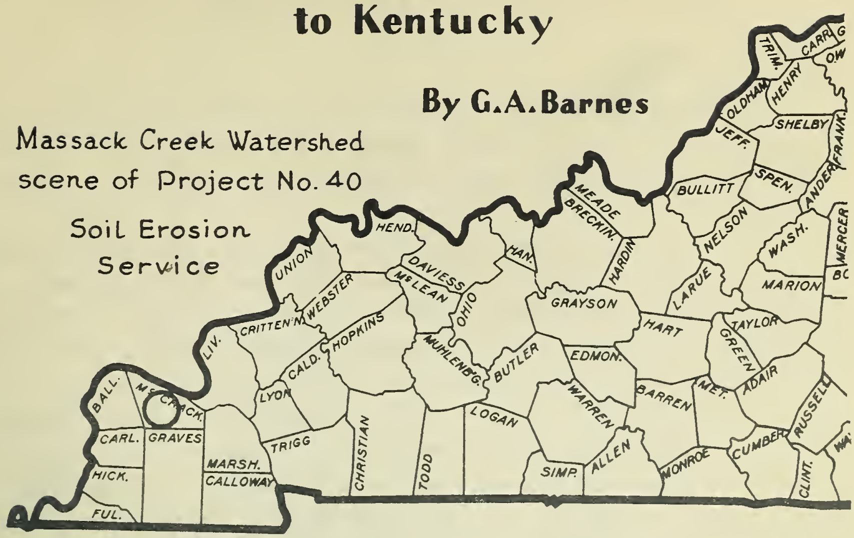
Regional Director, Illinois Project

an Illinois man in charge of an Illinois demonstration area...born in 1888 in Illinois...schooled in Illinois, culminating with a B.S. in agronomy from the University in 1907...for ten years after his graduation, Forrest A. Fisher remained at Urbana as instructor in soils, resigning to handle the varied work of a county agricultural agent... "if any one project brings out a man's ability it is county agent work and all its preambles of the farmer's problems"...and in that capacity he remained until 1930...the next three years with the Farm Management Service, where he handled farm planning and cost records for some 200 farms...under the guidance of the College of Agriculture, he was able to secure a real insight into the farmers' financial problems...published several bulletins, including "The Agricultural Significance of the Tight Clay Subsoil of Southern Illinois"...entered the Soil Erosion Service in 1933 to head one of the first projects established... has had more experience in making soil erosion surveys than any other man in that section of the country, according to authorities...stubby, genial, earnest...

Erosion Control Comes to Kentucky

By G.A.Barnes

Massack Creek Watershed scene of Project No. 40 Soil Erosion Service



Inauguration of the federal soil conservation program in Kentucky has been approved by Secretary of the Interior Harold L. Ickes, with the selection of a 25,000-acre erosion control demonstration project in McCracken County, five miles southwest of the city of Paducah.

Embracing the watershed of Massac Creek, the project is intended as a nucleus for erosion-control activities in the state. Preliminary work will be started at once, according to Director H. H. Bennett of the Soil Erosion Service, with an allotment of $90,000. Project headquarters probably will be at Paducah.

In soil and erosion conditions, Mr. Bennett states, the 25,000-acre project area is typical of approximately 13,000,000 acres of highly erodible land extending from southern Illinois to central Mississippi. Erosion control measures applied in the demonstration area by experts of the Soil Erosion Service will therefore be adaptable to this entire surrounding region.

The area selected for the Kentucky project is thickly settled, with 95 percent of the farms owner-operated. Farms in the area average 50 acres in size. Full cooperation on the part of farmers of the region has been assured by William Johnstone, extension agent for McCracken county, and other Kentucky agricultural officials.

"Although more thickly settled than most of West Kentucky and Tennessee", according to Mr. Johnstone, "from an erosion standpoint the area represents a perfect picture of what is happening throughout this district.

"The rich bottom lands of the valley are rapidly being covered by infertile soil from the surrounding hills. The creek and its tributaries are being filled. Many fields are already abandoned."

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SERVICE TO COOPERATE WITH HOMESTEAD PROJECT

A cooperative arrangement under which the Soil Erosion Service will direct an erosion-control and land-use program on the Federal Subsistence Homesteads project at Monticello, Georgia, has been announced.

Under the arrangement, which combines in one area the activities of two important emergency agencies of the Interior Department, specialists of the Soil Erosion Service will direct Monticello homesteaders in the use of scientific farming methods designed to curb erosion and preserve the land in a permanently productive condition.

The homesteaders will be required, as a part of their agreement with the Subsistence Homesteads Division, to adopt and carry out whatever farm practices and erosion-control measures are recommended by the Service. These will include such measures as terracing, gully control, strip-cropping, contour plowing, reforestation, crop rotation and pasture management. Every farm within the homestead project will be studied by experts of the Service to determine the extent of erosion and the nature of the control measures best adapted to the problems of each parcel of land. A coordinated plan of erosion control treatment will then be worked out for the individual farm and for the project area as a whole.

All material and equipment, except two heavy tractors for terrace construction, will be furnished by the Subsistence Homesteads Division. Actual labor will be done largely by the homesteaders themselves under the supervision and guidance of Soil Erosion Service experts.

The two heavy tractors, to be supplied by the Soil Erosion Service for terracing work, will later be transferred to some other erosion-control project needing equipment of this nature. Supervisory and technical personnel will be drafted temporarily by the Service from the staffs of several other erosion-control projects in the locality.

Because of the highly erodible nature of the soil in this section of the country and the excessive damage to farm lands caused already by erosion, some action to halt the destruction of land values is regarded as imperative if the region is to remain fit for cultivation.

Approximately $14,000 will be spent by the Soil Erosion Service, it is estimated, in carrying out its share of the joint program.

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